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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/091,818	03/06/2002	James A. Frazier JR.	50847.00114	9406

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EXAMINER
ISSING, GREGORY C

ART UNIT	PAPER NUMBER
3662	

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DATE MAILED: 05/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/091,818	FRAZIER ET AL.	
	Examiner	Art Unit	
	Gregory C. Issing	3662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *38-48 and 50-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *38-48 and 50-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

EA

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 50 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 50 is indefinite since it is dependent upon a canceled base claim. It will be assumed for this Office Action that it is dependent upon claim 38. Applicant is required to correct the dependency in response to this Office Action.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 38, 42, 43, 44, 47, and 51 are rejected under 35 U.S.C. 102(e) as being anticipated by Young et al.

Young et al disclose an autonomous relative positioning system with applications in autonomous formation flying (AFF) wherein each member of the formation has a transceiver communicating with the others to allow relative positioning and attitude with respect to each other in the formation (col. 2, lines 7-15 and col. 11, lines 25-55). In another aspect of Young et al, a controlling system continuously compares measured positions and orientations of the formation members with a set of desired values and initiates corrective sequences or maneuvers to maintain the desired formation configuration (col. 2, lines 43-49). Additionally, the use of GPS receivers for determining absolute position and attitude of each formation member improves the relative position and attitude solutions (col. 2, lines 50-59) as well as expedites the processing cycle (col. 6, lines 50-52). Applications to aircraft collision avoidance and formation flying are taught (col. 2, lines 60-67). One of the major components of the AFF is the controller that communicates with every AFF transceiver to receive "reporting" data therefrom. The AFF controller determines the instant formation configuration based on the reported data, compares the measured configuration to a desired configuration, and generates appropriate correction instructions to one or members to adjust the relative position or attitude with respect to other AFF members so that the deviation is minimized (col. 5, lines 34-50). A master-slave control configuration similar to the claimed lead-second aircraft operation is taught (col. 11, lines 14-19 and col. 12, line 48 – col. 13, line 30).

Young et al therefore teach a master AFF controller that receives positioning and attitude data with respect slave members, each of the master and slaves incorporating GPS receivers. Wherein the master member determines the relative formation configuration, compares it to a desired configuration, generates and transmits commands to the slaves to maneuver the slave members so as to reduce the deviation from the desired configuration. Although, most of the discussion in Young et al is directed to space satellites, aircraft formation flying embodiments are disclosed and within the scope of the teachings therein. The commands generated by the master and received by the slave constitute steering commands for controlling the slave so as to maintain the predetermined formation.

Applicant argues that the claimed subject matter is patentable over both Young (and Constant) since the limitation of "data link means for passively receiving broadcast data from a second aircraft, the broadcast data comprising indicia of position of the second aircraft." The applicant's arguments with respect to Constant are moot in view of the rejection being directed to Young. The use of "Constant" in the body of the arguments in the previous response was a typographical error; the rejection clearly made reference to the previous Office Action to set forth the rejection with respect to Young. Applicant's argument regarding "passively receiving broadcast data" is not convincing since Young does not disclose any requirement for a master AFF to interrogate a slave AFF to obtain the position information. Rather, each AFF unit broadcasts its positional information and the master AFF without any requirement of interrogation of each slave AFF receives the positional information. Applicant's argument that the adjustment of attitude to search for signals constitutes an "active" reception is merely applicant's opinion; applicant in fact agrees that the AFF members do not need to actively emit signals in order to receive signals. The adjustment of attitude does not constitute "actively receiving broadcast data" as the terms "active" and "passive" in the art of navigation/communication relates to two-way or one-way, respectively. Thus, for the system to be active, there would be a request or interrogation by a first member to a second member and a responsive reply from the second member t the first member. For the system to be passive, no initial interrogation or request is sent out and a receiver merely receives signals

without any previous interaction with the transmitter. Furthermore, once an initial acquisition of each member is determined during setup in Young, a line of communication is maintained and from then on each unit inherently receives the broadcasted position information in a passive manner, i.e. without any interrogation.

Thus, the rejection is maintained and the applicant's arguments are not convincing.

5. Claims 39-41, 45, 46, 48, 50 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al in view of Constant and either one of Boisvert or Drouilhet, Jr et al.

Young et al teach the subject matter substantially as claimed as previously set forth above but fail to show the use of a channel of ADS-B, extended squitter, or Mode S data link as the communication channel over which the position information is communicated. Additionally, the control of multiple formations is not specified.

Constant teaches the control of multiple formations using the relative position information and a processor for generating piloting commands. Each of Boisvert and Drouilhet, Jr. et al teach the use of the various forms of transmissions known in the industry for broadcasting GPS position information including ADS-B, extended squitter and Mode S transponder.

It would have been obvious to one having ordinary skill in the art to modify Young et al by further controlling multiple cells of platforms via a communication channel between a head leader and a secondary head leader in communication with the head leader and controlling its own set of followers in view of the teachings of Constant to provide unified movement of vehicles. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Young et al in view of Constant by using well-known existing communication channels to broadcast the GPS navigation information of Young et al including ADS-B, extended squitter and Mode S transponder in view of the teachings of either one of Boisvert and Drouilhet, Jr et al to avoid duplication of transmitters in the aircraft and thus minimize cost and space.

Applicant substantially relies on the independent claim for patentability (page 7 of the Remarks (03/21/05). Applicant argues that since claim 38 is not rejected on the basis of this rejection, the ground for rejection of the dependent claims should be withdrawn. This argument is not convincing since claim 38 is rejected over Young by itself under 35 USC 102(e). Thus, all of the teachings of Young relate to the limitations of claim 38. The rejection is maintained.

6. Claims 38-48 and 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fraughton et al in view of Constant and either one of Boisvert or Drouilhet, Jr. et al.

Fraughton et al disclose a direct, pilot-based system of traffic control and communication that does not require radar or interfere with existing TCAS yet provides inter-aircraft safety. The system operates without interrogation requirements to provide collision avoidance, navigation and emergency location functions. Figures 1A and 1B show the steps involved including transmitting own position, passively receiving other aircraft positions and displaying the positions of other aircraft relative to own (col. 11, lines 42-52). Fraughton et al suggest various position determining means, most particularly, GPS. When collision is possible, the secondary aircraft will receive a collision alert from the primary aircraft (col. 12, lines 3-11). Thus, Fraughton et al teach a system for avoiding collisions of aircraft including datalink transceivers for passively receiving broadcast data from other aircraft indicative of at least position, a navigation receiver for determining own aircraft position, processing means for determining the relative location of the other aircraft with respect to own, detecting possible collision, and generating an alert message in response to detection of possible collision.

Fraughton et al differ from the claimed subject matter since the response to detection of collision is the generation of a warning message and not a steering command that is generated and transmitted to the other aircraft in a formation. Additionally, the use of a channel of ADS-B, extended squitter, or Mode S data link is not specified as the communication channel over which the position information is communicated.

Constant teaches a system for aiding formation movement, particularly the flight of aircraft, wherein within each formation the relative positioning of the aircraft are controlled to avoid collisions. Position information is exchanged between a leader and follower, and the leader uses the analyzed relative positions in calculating commands to the apparatus of each follower including a command position (angle and distance from the leader), a commanded heading, a commanded speed, and a commanded altitude. The use of the commands, in a unified approach, is governed by predetermined rules of pilotability so that predetermined margins of safety are maintained and so that the danger of collisions is reduced. Each of Boisvert and Drouilhet, Jr et al teach the use of the various forms of transmissions known in the industry for broadcasting GPS position information including ADS-B, extended squitter and Mode S transponder.

It would have been obvious to one having ordinary skill in the art to modify Fraughton et al by incorporating the teachings of Constant whereby the relative position information used for collision avoidance is utilized in a fashion so as to provide a unified set of commands to certain aircraft when flying in a formation to reduce the danger of collisions, which is a specific environment meeting the scope of Fraughton et al, i.e. monitoring a fleet of aircraft within a predetermined range of one another for collision avoidance. Constant teaches the conventionality of formation flying. The dictated commands of Constant meet the scope of the claimed steering commands.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Fraughton et al in view of Constant by using well-known existing communication channels to broadcast the GPS navigation information of Fraughton et al including ADS-B, extended squitter and Mode S transponder in view of the teachings of either one of Boisvert and Drouilhet, Jr et al to avoid duplication of transmitters in the aircraft and thus minimize cost and space.

Applicant argues that Fraughton et al do not show steering commands but rather only shows sending alerting messages to indicate possibility of collision. The rejection makes clear that Fraughton et al do not show the claimed generation and transmission of steering commands and indicates why Constant, who does suggest generation and transmission of steering commands, would have been an obvious modification to Fraughton et al wherein the alert message could provide steering commands in order to avoid collision.

Applicant argues that Constant does not teach "means for generating a steering command to maintain separation between the lead aircraft and the second aircraft in accordance with relative aircraft position of the lead and second aircraft." The applicant argues that the teachings of Constant of providing commands dictating a position, heading, speed and altitude of each slave do not equate to the claimed steering command. This argument is not convincing since Constant clearly suggest a leader calculating commands to the apparatus of each slave wherein the command comprise a command position (relating to the angle and distance from the leader), a commanded heading, a commanded speed and a commanded altitude (col. 2, par. 4). There is no distinction between the leader-calculated command position that indicates the separation distance and angle

between the leader and follower in Constant (as well as the commanded heading, speed and altitude) and the claimed "means for generating a steering command to maintain separation between the lead aircraft and the second aircraft." Moreover, the leader-calculated commands are further transmitted to the follower who subsequently receives such to control the follower. The leader determines the spatial positioning of the slaves within a formation including the distances therebetween, the bearing angles between a reference direction DR and the directions to the various slaves Gj, and the site angles from the leader to the various slaves Sj. Thus, the applicant's argument that Constant does not teach generating and transmitting steering commands is not persuasive.

Applicant argues that neither Boisvert nor Drouilhet, Jr. et al has a disclosure that can be regarded as teaching steering commands. However, the rejection does not use Boisvert or Drouilhet, Jr. et al for teaching transmission of steering commands as this is provided by Constant.

Thus, the rejection is maintained and the applicant's arguments are not convincing.

7. Claims 38-48 and 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coles et al in view of Constant and either one of Boisvert or Drouilhet, Jr et al.

Coles et al teach an aircraft location and identification system for collision avoidance including a first and second aircraft having GPS navigation means for determining position, time and motion information as well as a transmitter for broadcasting the navigational information to any receiver within a predetermined range and a receiver for passively receiving the transmitted navigational information from other aircraft. The processor uses the own navigational data as well as the received navigational data to determine the relative aircraft positions and tracks in order to determine whether or not there is a probability of collision. Upon determination thereof, a warning is generated and provided. Coles et al differ from the claimed subject matter since the response to detection of collision is the generation of a warning message and not a steering command that is generated and transmitted to the other aircraft. Additionally, the use of a channel of ADS-B, extended squitter, or Mode S data link is not specified as the communication channel over which the position information is communicated.

Constant teaches a system for aiding formation movement, particularly the flight of aircraft, wherein within each formation the relative positioning of the aircraft are controlled to avoid collisions. Position information is exchanged between a leader and follower, and the leader uses the analyzed relative positions in calculating commands to the apparatus of each follower including a command position (angle and distance from the leader), a commanded heading, a commanded speed, and a commanded altitude. The use of the commands, in a unified approach, is governed by predetermined rules of pilotability so that predetermined margins of safety are maintained and so that the danger of collisions is reduced. Each of Boisvert and Drouilhet, Jr et al teach the use of the various forms of transmissions known in the industry for broadcasting GPS position information including ADS-B, extended squitter and Mode S transponder.

It would have been obvious to one having ordinary skill in the art to modify Coles et al by incorporating the teachings of Constant whereby the relative position information used for collision avoidance is utilized in a fashion so as to provide a unified set of commands to certain aircraft when flying in a formation to reduce the danger of collisions, which is a specific environment meeting the scope of Fraughton et al, i.e. monitoring a fleet of aircraft within a predetermined range of one another for collision avoidance. Constant teaches the conventionality of formation flying.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Coles et al in view of Constant by using well-known existing communication channels to broadcast the GPS navigation information of Coles et al including ADS-B, extended squitter and Mode S transponder in view of the teachings of either one of Boisvert and Drouilhet, Jr et al to avoid duplication of transmitters in the aircraft and thus minimize cost and space.

Applicant argues that Coles et al do not disclose generation and transmission of steering commands and that the generation and transmission of alert messages do not constitute the steering commands. However, the rejection is based on the teachings of Constant to show the generation and transmission of steering commands. The rejection sets forth the combination of the teachings of Coles et al and Constant wherein steering commands are substituted for the alert messages for avoiding collision. The dictated position commands of Constant meet the scope of the claimed steering commands.

Applicant argues that neither Boisvert nor Drouilhet, Jr. et al has a disclosure that can be regarded as teaching steering commands. However, the rejection does not use Boisvert or Drouilhet, Jr. et al for teaching transmission of steering commands.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory C. Issing whose telephone number is (571)-272-6973. The examiner can normally be reached on Monday - Thursday 6:00 AM- 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on (571)-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gregory C. Issing
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gci

5/23/05